Quantitative models and methods in management II

Academic Year: (2022 / 2023) **Review date: 25/05/2022 12:09:32**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: GARCIA GUTIERREZ, ISABEL

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No previous courses are required.

OBJECTIVES

- Knowledge and understanding of the fundamentals of quantitative algorithms and techniques for solving complex problems in industrial organization.
- Being able to identify the most appropriate quantitative technique according to the nature of the problem being treated.
- Being able to create an original simulation model in order to improve a real system, making modeling decisions in collaboration with other colleagues. Being able to apply the statistical techniques necessary to develop valid models and obtain results.
- Being able to identify non-polynomial problems that require the use of heuristic approximations for their resolution.
- Knowing the fundamentals and dynamics of heuristic search algorithms and algorithms inspired by nature.
- Being able to present and defend the suitability of the decisions made in the context of applying quantitative techniques and algorithms to solve complex problems in industrial organization.

DESCRIPTION OF CONTENTS: PROGRAMME

-Productive and logistic system analysis by means of discrete event simulation.
-Design of simulation models of real systems. Definition of objectives and adoption of simplifying hypotheses.
-Implementation of simulation models. Programming in Witness (simulation software) for the development of a model of a real system.
-Application of the necessary statistical techniques in the different stages of development and exploitation of the model.
-Result analysis and configuration comparison in simulation.
-Introduction to NP problems. Review of the classical NP problems: the salesman problem, the knapsack problem, task programming with limited resources.
-Heuristic search algorithms.

LEARNING ACTIVITIES AND METHODOLOGY

Lectures, exercises, practical sessions, cases and assignments to be carried out by the students and discussed during the sessions, autonomous student work, individual and group toutoring. Practical sessions in the laboratory. Participation in the partial and final evaluation sessions.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

Midterm exam, group project, compulsory practices and resolution of exercises.

Minimum mark in the simulation exam (mid term exam): 3.5
Minimum mark in the metaheristic algorithm exam: 3

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

BASIC BIBLIOGRAPHY

- Adenso Díaz Optimización heurística y redes neuronales, Paraninfo, 1996 (Capítulos 1 y 3)

- Goldberg Genetic algorithms in search, optimization, and machine learning, Addison-Wesley, 1989 (Capítulos 1 y 2)

- Haupt and Haupt Practical genetic algorithms, John Wiley & Sons, 1998

- Law and Kelton Simulation modeling and analysis , McGraw-Hill, 2007

- Rich and Knight Inteligencia artificial, McGraw-Hill, 1994 (Capítulos 2 y 3)

- Taha, H. Investigación de operaciones, Pearson, 2004